

U.S. Global Change Research Program National Climate Assessment Global Change Information System

Curt Tilmes

ctilmes@usgcrp.gov



United States
Global Change
Research Program

www.globalchange.gov

The Global Change Research Act and USGCRP

- USGCRP was mandated by Congress in the Global Change Research Act (GCRA) of 1990 (P.L. 101 – 606)

*“To provide for development and **coordination** of a comprehensive and integrated United States Research Program which will assist the Nation and the world to **understand, assess, predict, and respond** to human-induced and natural processes of global change.”*



U.S. Global Change Research Program

The Program:

- **Coordinates** Federal research to better understand and prepare the nation for global change
- **Prioritizes** and supports cutting edge scientific work in global change
- **Assesses** the state of scientific knowledge and the Nation's readiness to respond to global change
- **Communicates** research findings to inform, educate, and engage the global community



United States Global Change Research Program





U.S. Global Change Research Program

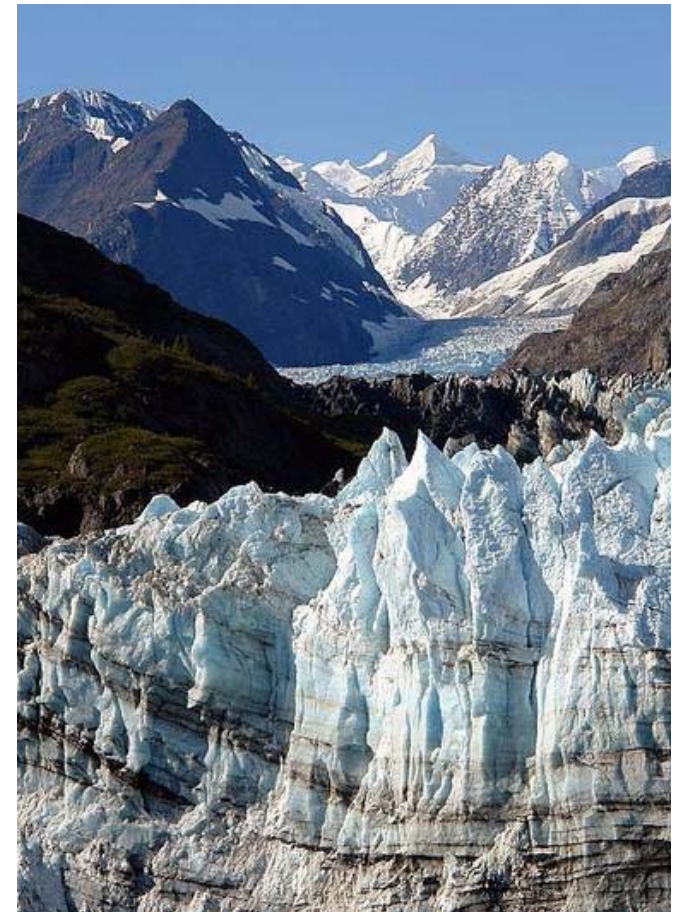
National Climate Assessment

<http://assessment.globalchange.gov>

Global Change Research Act (1990), Section 106

...not less frequently than every 4 years, the Council... shall prepare... an assessment which—

- integrates, evaluates, and interprets the findings of the Program and discusses the scientific uncertainties associated with such findings;
- analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and
- analyzes current trends in global change, both human- induced and natural, and projects major trends for the subsequent 25 to 100 years.



United States
Global Change
Research Program

Previous National Climate Assessments

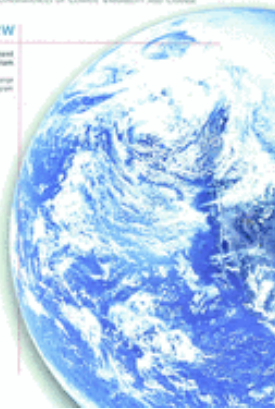
Climate Change Impacts on the United States (2000)

CLIMATE CHANGE IMPACTS ON THE UNITED STATES

The Potential Consequences of Climate Variability and Change

Overview

National Assessment
Synthesis Team
U.S. Global Change
Research Program

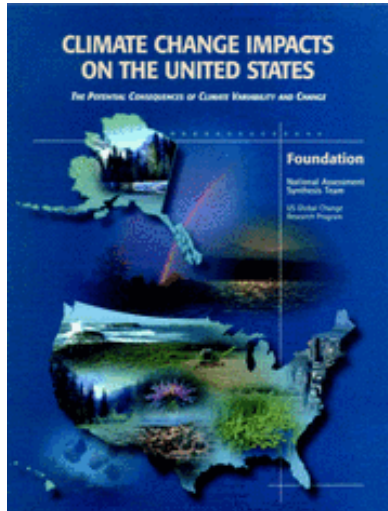


CLIMATE CHANGE IMPACTS ON THE UNITED STATES

The Potential Consequences of Climate Variability and Change

Foundation

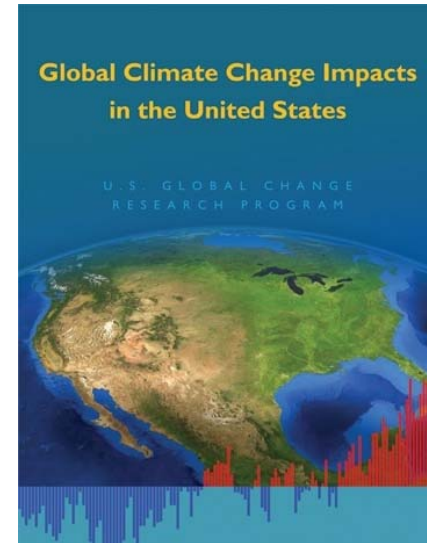
National Assessment
Synthesis Team
U.S. Global Change
Research Program



Global Climate Change Impacts in the United States (2009)

Global Climate Change Impacts in the United States

U.S. GLOBAL CHANGE
RESEARCH PROGRAM



<http://nca2009.globalchange.gov>

Target date for next NCA: 2013



United States
Global Change
Research Program

The “New” National Climate Assessment



Goal

- Enhance the ability of the United States to anticipate, mitigate, and adapt to changes in the global environment.

Vision

- Advance an inclusive, broad-based, and *sustained process* for assessing and communicating scientific knowledge of the impacts, risks, and vulnerabilities associated with a changing global climate in support of decision-making across the United States.



Transparency & Traceability

Rationale

A focus on transparency and traceability helps achieve two objectives:

- **Credibility**
 - Reproducibility
 - Transparency of process/ verification of approach
 - Quality of data, and appropriate use of data sources
- **Usability**
 - Access to underlying data and information allows application of conclusions
 - Information about confidence and ‘uncertainty’ if traceability is built-in

AND there have many calls for increased transparency and traceability in the assessment context



IQA Calls for Utility, Integrity, and Objectivity...

- Information Quality Act

*Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001
-- Public Law 106-554*

- **NOAA IQA Guidelines**

- Ensure and maximize the quality (*utility, integrity and objectivity*) of information disseminated* by the agency

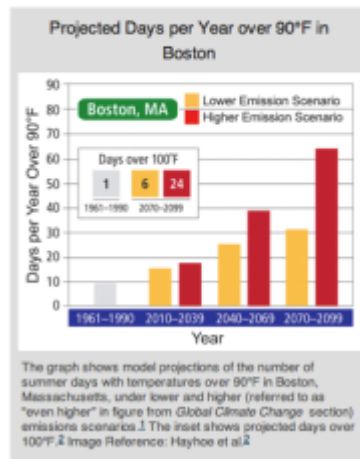
1. Utility
2. Integrity
3. Objectivity

Transparency
Authenticity
Traceability

Track Chain of Custody of Data

Rising Temperatures

Extreme heat and declining air quality are likely to pose increasing problems for human health, especially in urban areas.

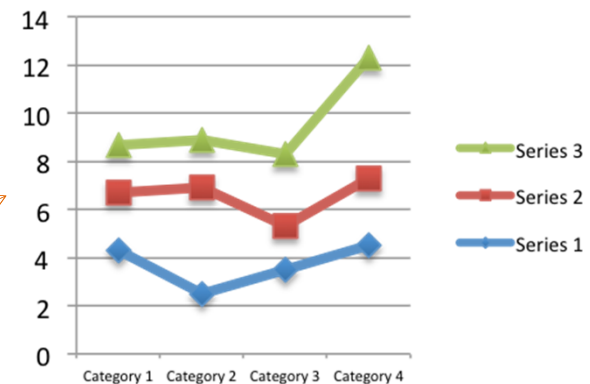


NCA Report

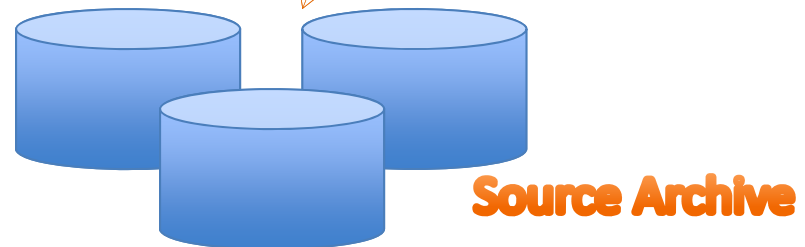
Heat waves, which are currently rare in the region, are projected to become much more commonplace in a warmer future, with major implications for human health (see [Human Health](#) sector).^{5,6}

In addition to the physiological stresses associated with hotter days and nights,⁷ for cities that now experience ozone pollution problems, the number of days that fail to meet federal air quality standards is projected to increase with rising temperatures if there are no additional controls on ozone-causing pollutants.⁸ (see [Human Health](#) sector). Sharp reductions in emissions will be needed to keep ozone within existing standards.

Projected changes in summer heat (see figure on left) provide a clear sense of how different the climate of the Northeast is projected to be under lower versus higher emissions scenarios. Changes of this kind will require greater use of air conditioning (see [Energy](#) sector).



Data
Version control



Provenance: documentation of sources, chain of custody of data



United States
Global Change
Research Program

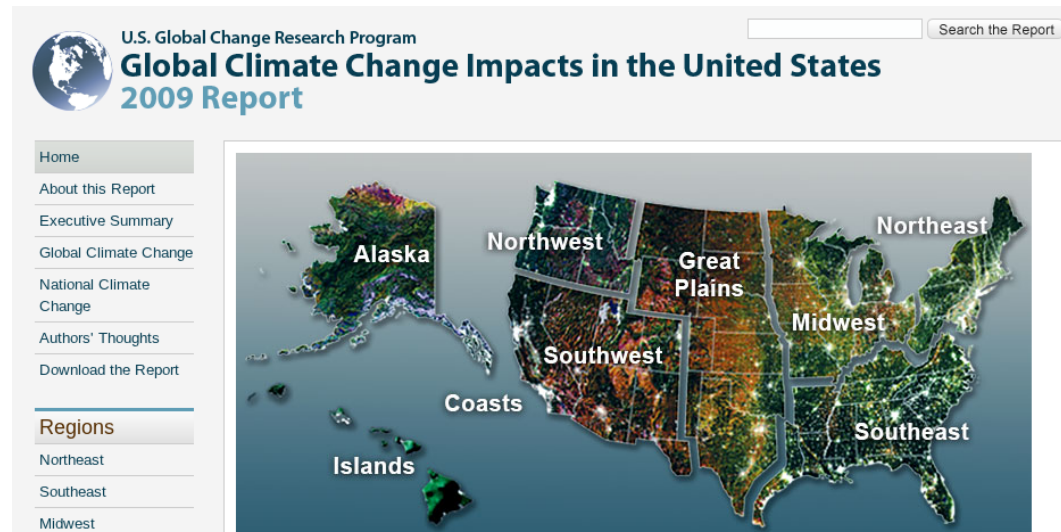
NCA Web Goals

- NCA will not host basic data, but will provide *central access* and consistent, interpretable *metadata*
- Metadata will adhere to common *standards*
- Accessible “traceable accounts” for all key findings
- Indicators
- Quality and provenance of data will be clear and peer reviewed
- *Interoperable* data system – open interface into data
- Narrative assessment and graphics will link to source data and information
- Usable and accessible interface
- Link to case studies and associated information and tools (outside the NCA)



NCA 2009

<http://nca2009.globalchange.gov>



About This Website

This website is intended to make the 2009 National Climate Assessment ("Global Climate Change Impacts in the United States") more accessible to a variety of interested readers. Several features of this site are prototyping greater traceability of source material, better searchability of the assessment as a whole and enhanced access to images and references. For example, in this 2009 report, you will find links to several supporting datasets, including links from clickable images, a more searchable suite of references, a search function for the entire report, and better linking between chapters. Please note however, that this web based deployment of the 2009 National Climate Assessment is in a trial phase and is intended to help us learn better techniques for future assessments; it is not intended to provide complete, retroactive access to all source material. Lessons learned from this process are being applied in the development of the next synthesis of the [National Climate Assessment, due in 2013](#).



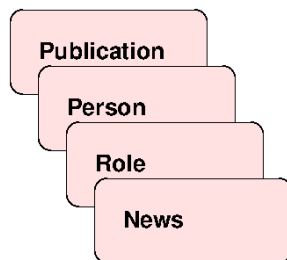
Global Change Information System (GCIS)

Vision:

A unified web based source of *authoritative*, *accessible*, *usable*, and *timely* information about climate and global change for use by scientists, decision makers, and the public.

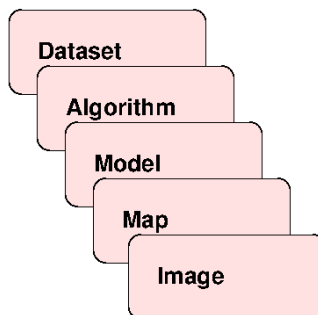


GCIS



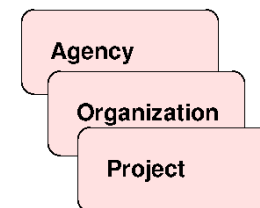
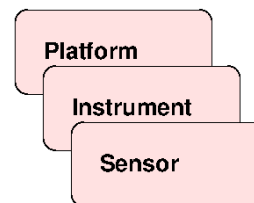
Catalog items that are mature, authoritative, persistent, with an appropriate subset of suitable metadata.

Tag each item with topic keywords and relationships.



Maintain link back to the Agency 'home' for each item.

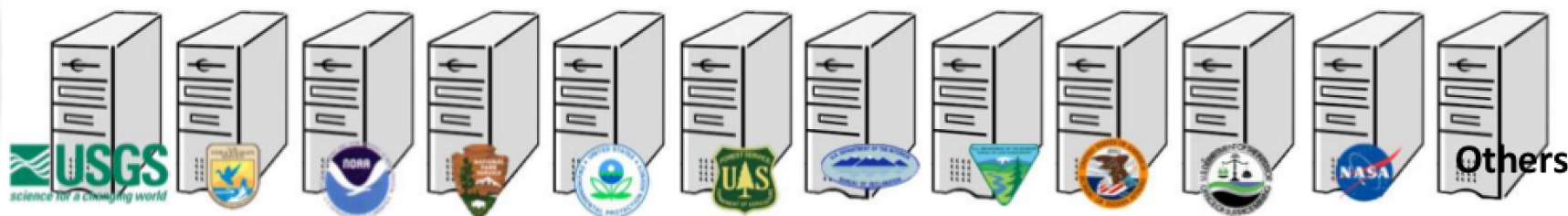
Structured Metadata
Field: Value
Field: Value
Field: Value
Field: Value



National Climate Change
Human Health
Islands
Energy Supply and Use
Regional Adaptation
Midwest
Great Plains

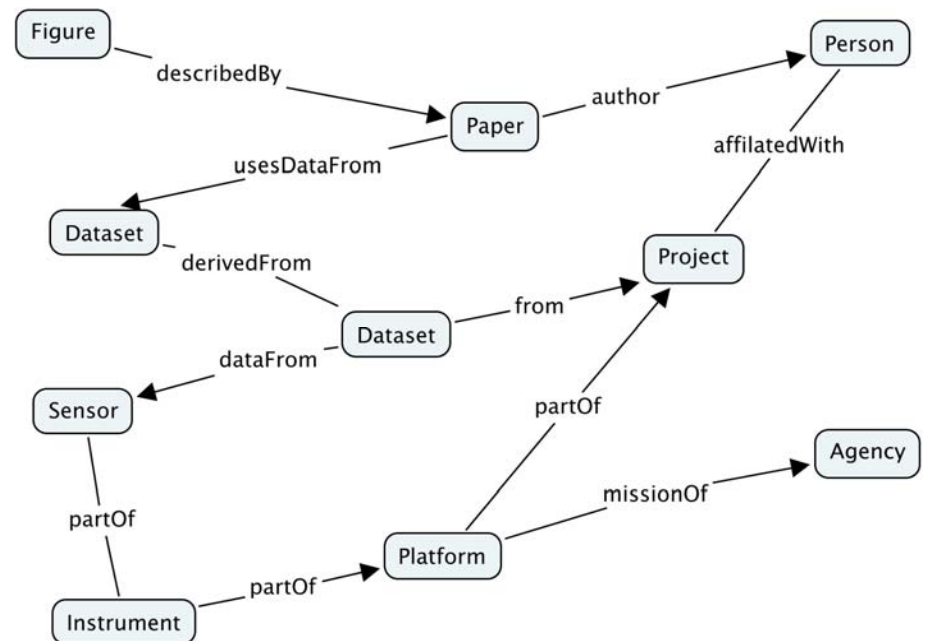
Sectoral Adaptation
Southwest
Northwest
Ecosystems
Coasts
Global Climate Change
Transportation
Southeast
Agriculture

Northeast
Society
Water Resources
Alaska



GCIS

- Create an *entity* from the structured metadata about each thing – tag with related *concepts*.
- Identify it with a persistent, controlled *identifier*.
- Present with a human readable web page and a *machine interface*.
- Represent all *relationships* between items.



NCA links to GCIS entities

<http://nca2009.globalchange.gov/southeast>

Southeast

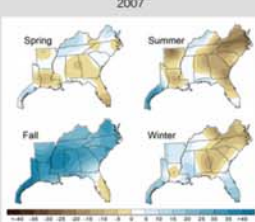
The climate of the Southeast is uniquely warm and wet, with mild winters and high humidity, compared with the rest of the continental United States. The average annual temperature of the Southeast did not change significantly over the past century as a whole. Since 1970, however, annual average temperature has risen about 2°F, with the greatest seasonal increase in temperature occurring during the winter months. The number of freezing days in the Southeast has declined by four to seven days per year for most of the region since the mid-1970s.

Table of Contents [hide]

1. Rising Temperatures
2. Water Resources
3. Sea-level Rise and Hurricane Intensity
4. Ecosystems
5. Society
 - Adaptation: Reducing Exposure to Flooding and Storm Surge
6. References

[Link to Image Gallery](#) | [Download a PDF of this chapter](#)

Observed Changes in Precipitation 1901 to 2007



While average fall precipitation in the Southeast increased by 30 percent since the early 1900s, summer and winter precipitation declined by nearly 10 percent in the eastern part of the region. Southern Florida has experienced a nearly 10 percent drop in precipitation in spring, summer, and fall. The percentage of the Southeast region in drought has increased over recent decades. Image Reference: NOAA/NCDC

Average autumn precipitation has increased by 30 percent for the region since 1901. The decline in fall precipitation in South Florida contrasts strongly with the regional average. There has been an increase in heavy downpours in many parts of the region,^{2,3} while the percentage of the region experiencing moderate to severe drought increased over the past three decades. The area of moderate to severe spring and summer drought has increased by 12 percent and 14 percent, respectively, since the mid-1970s. Even in the fall months, when precipitation tended to increase in most of the region, the extent of drought increased by 9 percent.

Climate models project continued warming in all seasons across the Southeast and an increase in the rate of warming through the end of this century. The projected rates of warming are more than double those experienced in the Southeast since 1975, with the greatest temperature increases projected to occur in the summer months. The number of very hot days is projected to rise at a greater rate than the average temperature. Under a lower emissions scenario,⁴ average temperatures in the region are projected to rise by about 4.5°F by the 2080s, while a higher emissions scenario⁴ yields about 9°F of average warming (with about a 10.5°F increase in summer, and a much higher heat index). Spring and summer rainfall is projected to decline in South Florida during this century. Except for indications that the amount of rainfall from individual hurricanes will increase,² climate models provide divergent results for future precipitation for the remainder of the Southeast. Models project that Gulf Coast states will tend to have less rainfall in winter and spring, compared with the more northern states in the region (see [precipitation projection maps](#) in the *National Climate Change* section). Because higher temperatures lead to more evaporation of moisture from soils and water loss from plants, the frequency, duration, and intensity of droughts are likely to continue to increase.

Average Change in Temperature and Precipitation in the Southeast				
	Temperature Change in °F		Precipitation Change in %	
	1901-2008	1970-2008	1901-2008	1970-2008
Annual	0.3	1.6	6.0	-7.7
Winter	0.2	2.7	1.2	-9.6
Spring	0.4	1.2	1.7	-29.2
Summer	0.4	1.6	-4.0	3.6
Fall	0.2	1.1	27.4	0.1

Observed temperature and precipitation changes in the Southeast are summarized above for two

http://globalchange.gov/dataset/USHCN_002

The U.S. Historical Climatology Network (USHCN) Version 2 Serial Monthly Dataset

Name:	The U.S. Historical Climatology Network (USHCN) Version 2 Serial Monthly Dataset
Data type:	Monthly Temperature and Precipitation Data
Data source:	NOAA/NCDC
Available at:	http://www.ncdc.noaa.gov/data/ushcn/
Used in figures:	1. Observed Changes in Precipitation 1901 to 2007 2. Winter Temperature Trends, 1975 to 2007
References:	Menne, M.J., C.N. Williams Jr., and R.S. Vose, 2009: The U.S. Historical Climatology Network Monthly Temperature Data, Version 2. <i>Bulletin of the American Meteorological Society</i> , 90, 993-1107. Menne, M.J. and C.N. Williams Jr., 2009: Homogenization of temperature series via pairwise comparisons. <i>Journal of Climate</i> , 22(5), 1759-1771.

<http://globalchange.gov/agency/NOAA>



<http://globalchange.gov/datacenter/NCDC>

<http://globalchange.gov/paper/doi/10.1175/2008BAMS2613.1>

Menne, M.J., C.N. Williams Jr., and R.S. Vose, 2009: The U.S. Historical Climatology Network Monthly Temperature Data, Version 2. *Bulletin of the American Meteorological Society*, 90, 993-1107.

Journal: Bulletin of the AMS

<http://globalchange.gov/journal/BAMS>

Meene, M.J. <http://globalchange.gov/person/235>

C.N. Williams Jr. <http://globalchange.gov/person/587>

R.S. Vose <http://globalchange.gov/person/372>

http://globalchange.gov/software/USHCN_V52d.20100217

Pairwise Homogeneity Adjustment Software



United States
Global Change
Research Program

Interagency Information Integration

GCIS can use relationships between all relevant information about global change across the agencies:

- From observations to datasets to research papers to models to analyses to organizations to people to synthesized reports to human impacts...
- Determine *agency interdependencies* -- An EPA analysis uses a NOAA model dependent on observations from a NASA satellite.
- Can present *unique interagency metrics* "How many papers referenced datasets from a specific satellite?"
- Direct users *back to agency data centers* for more detailed information and the actual content and data.



GCIS Benefits

NCA web portal, GCIS prototype

- NCA content available online
- Searchable, linkable
- Complete provenance, **traceability**
- Links back to source information including agency sources, scenarios, technical input
- Link to associated and applicable information and tools
- Ensure **authoritative** and appealing design and **accessibility**
- Incorporates initial **indicators** of change, impact and response
- Access to information about NCA process (transparency)
- Facilitates collaboration across segments of the climate science and applications community
- **Construct, prototype and test the initial framework**
- **Use constrained scope and dedicated staff to accomplish a lot in a short time**
- **Ensure the system design is extensible and able to grow to meet long term GCIS needs**

GCIS

- A single web site can lead back to agency global change information across the program
- A friendly, accessible entry into global change information for non-scientists
- Global, persistent, reusable identifiers for each item
- Integrated data catalog provides interagency metrics, data mining, searching, etc.
- Interagency relationships allow discovery of interdependencies and increase collaboration opportunities
- Agency information mapped into a common, consistent model with a standard vocabulary
- Concept tagging and linking improves search results for agency products



Questions and Comments

For more information, visit <http://www.globalchange.gov>



United States
Global Change
Research Program

